mechanics (principally Poisson's). In 1820 they made a translation of Lacroix's "Differential Calculus," and they prepared a volume of "Examples of the Differential and Integral Calculus." These were extensively studied; but the form of the College examinations or the University examinations was not, I think, influenced by them in the winter 1820-21 or the two following terms. But in the winter 1821-22 Peacock was one of the Moderators; and in the Senate-House Examination, January 1822, he boldly proposed a paper of important questions entirely in the differential calculus. This was considered as establishing the new system in the University. In January 1823 I think the two systems were mingled. Though I was myself subject to that examination, I grieve to say that I have forgotten many of the details, except that I well remember that some of the questions referred to Newton, Book III., on the lunar theory. To these I have already alluded.

No other work occurs to me as worthy of mention, except Woodhouse's "Lunar Theory," entirely founded on the differential calculus. The style of this book was not attractive, and it was very little read.

From this time to the times of which Mr. Glaisher treats, there were successive books on the new system, but none, I think, which can be cited as producing a marked effect in the University. G. B. Airy

NOTES

The University of Bologna has decided to celebrate its eight hundredth anniversary in the spring of 1888. The exact date of its foundation cannot, indeed, be determined, but all authorities on the subject agree that an important school was established at Bologna in the eleventh century. Afterwards the University took a great place as the chief centre for the study of jurisprudence, and there also anatomy was for the first time scientifically studied. The foremost Universities of Europe and America will no doubt be glad to take this opportunity of testifying their respect for so ancient and famous an institution.

At their meeting on February 3 the President and Council of the Royal Society adopted the following resolutions concerning the publication of the Philosophical Transactions:—That the Transactions be published in two independent series, one (*a*) containing those papers which are of a mathematical or physical character, the other (*b*) those of a biological character; that the papers in each series form a yearly volume, paged continuously (though issued in parts if the Secretaries find it convenient), but that each paper be also published separately in paper covers as soon as it is ready for publication; and that Fellows have the option of receiving one or both of the yearly volumes, or, should they prefer it, each separate paper of either or both series, or the whole of one series and any separate paper of the other series, immediately on publication. These resolutions are to take effect with the volume for the present year.

A Committee, lately appointed by the College of Physicians of Edinburgh, has reported in favour of the establishment and maintenance, by the College, of a laboratory for the prosecution of original research. The Committee proposes that the College shall vote from its capital 1000*l*. for the establishment of this laboratory, and, year by year, a sum not exceeding a third of the clear surplus of annual income over annual expenditure for its maintenance, including the payment of salaries The superintendent, it is thought, should devote his time wholly to the direction and prosecution of scientific research in the laboratory; and it is suggested that an assistant experienced in microscopic work should be engaged to reside on the premises. The Committee is of opinion that the laboratory should be open without fee to Fellows of the College, to members, and to any licentiate, medical man, or investigator who may, by testimonial or otherwise, be able to show that he is a fit person to use the laboratory for purposes of scientific research. Moreover, the Committee recommends that, if there should be sufficient funds after payment of expenses, a medal and money-prize (not exceeding twenty guineas) should be offered for original work. It is understood that this admirable scheme will be adopted, and we may hope that the example set by the Edinburgh College will soon be followed by the English College of Surgeons and College of Physicians.

A correspondent writes to us from Tashkend that on November 29 last, at 9.12 a.m, a violent shock of earthquake was felt there, accompanied by a great noise like thunder. The people were much frightened, and the majority of the buildings were more or less injured. Light shocks were felt also on December 3, and on January 9 and 16.

On the 15th of January last there was in some parts of Japan the most severe earthquake that has been experienced there since February 22, 1880. It fetched down a number of chimneys and parts of roofs in Yokohama, but in Tokio (eighteen miles distant) it only broke a few vases and created alarm. The important and peculiar feature of the disturbance was that it had a long period and large amplitude. At the Imperial Observatory at Tokio, where a number of "Gray-Milne seismographs" are employed, the pointers of the instrument were seen to move for nearly ten minutes. We learn from the *Japan Gazette* that the disturbance was felt at Tokio at 6h. 51m. 59s. p.m., commencing in a series of small waves. The greatest horizontal movement was 19·2 mm. (about ¾ inch). The time taken to describe the largest wave was 2·3 seconds. The vertical motion had a range of 5·5 mm. (about ¼ inch), and its period was ·8 seconds. Altogether there were 60 distinct waves, and the maximum velocity with which the earth moved to and fro was 26 mm., or about 1 inch per second. At Tokio people felt the motion as if they had been on a slowly-moving floating pier, and in many cases it provoked a sensation of nausea. The general distribution of destruction at Yokohama was similar to that which took place in 1880. The *Japan Gazette*, however, points out that many chimneys standing on ground which in 1880 suffered severely were this time uninjured. This "anomaly," it thinks, may be explained by the fact that the owners of these chimneys took advantage of the experience they gained in 1880, and rebuilt their chimneys with a special view to their safety.

The Right Hon. G. Sclater Booth, M.P., has accepted the Presidentship of the Congress of the Sanitary Institute of Great Britain, to be held at Bolton in September next.

On March 6 a century will have elapsed since the birth of the celebrated optician, Joseph von Fraunhofer, at Straubing, in Lower Bavaria. Preparations are being made in Munich for the due celebration of the day.

In the eleventh annual Report of the President of the Johns Hopkins University, Baltimore, Dr. Gilman is able to give a very satisfactory account of the progress made by the institution since its establishment in 1876. Much of its success, he thinks, is due to the system of Fellowships. Every year twenty young men who have given evidence of their attainments and of intellectual promise are selected by the authorities as Fellows, and are encouraged to devote all their time to the study of some branch of knowledge in which they have already shown proficiency. During the first ten years this honour has been bestowed upon 130 persons. Their names and the stations to which they have been called have been frequently printed, and Dr. Gilman says a scrutiny of the list will show that it contains the names of many excellent scholars. While resident at the University, the Fellows are recognised as holding an intermediate position between the Faculty and the great body of pupils. They are efficient members of the various literary and scientific associations, and occasionally give lectures on topics which they have specially studied.

A new quarterly journal, to be entitled the *American Journal of Psychology*, will soon be issued. Dr. G. Stanley Hall, Professor of Psychology and Pedagogics in the Johns Hopkins University, will be the editor. The *Journal* will contain original contributions of a scientific character; and articles of unusual importance will be translated from other languages, or even reprinted from other English and American publications, in full or in abstract, if not generally accessible. An attempt will be made in each number to give a conspectus of the more important psychological literature of the preceding three months, and to review significant books, bad as well as good.

A scientific and industrial Exhibition will be opened at Ekaterineburg in May next. The mining industries of the Ural Mountains will be well represented. Special interest will attach to the department of ethnography, as it has been arranged that there shall be in the Exhibition a number of families belonging to semi-barbarous tribes of the Ural Mountains and Siberia. Their dwellings will be exactly like those in which they usually live, and they will have with them the weapons and implements used by them in hunting and fishing. Another important element will be a collection of ancient objects in stone, bone, clay, and metal, found in Siberia and among the Ural Mountains. These objects have never before been publicly exhibited.

A Caucasian Agricultural Exhibition will be held next year in Tiflis. Products of the animal, vegetable, and mineral kingdoms will be exhibited.

Fish-hatching operations have begun at the Buckland Museum, where consignments of trout ova, presented by Sir James Maitland, have been laid down in the incubating apparatus used by the late Mr. Frank Buckland. The system upon which the ova are hatched at the Museum is that known as the "overflow," the water passing over the eggs, which are placed in slate boxes lined with gravel. The new system is called the "underflow," the water passing underneath the eggs, which are deposited in perforated zinc trays without gravel. Much diversity of opinion exists as to the efficacy of the two systems.

The other day some workmen, while removing brickwork that had surrounded a tank in the late South Kensington Aquarium, found ten eels secreted in a crevice of the masonry, which was perfectly dry. The tank had been removed eighteen days before, when the Aquarium was dismantled, so that the fish must have been without water during the whole of that time. When placed in water they appeared to have been in no way injured by their terrestrial experience.

In the debate on the appropriations for the support of the U.S. Coast Survey, the Senate, according to *Science*, pared the items down in a parsimonious spirit. Afterwards the Senate Appropriations Committee addressed a letter to the Secretary of the Treasury, inquiring whether the estimates as submitted by the Superintendent of the Coast Survey were satisfactory to that Department. The answer was that they were perfectly satisfactory, and a communication from the Superintendent of the Coast Survey was submitted, showing the reasons for each item of expenditure, and the present condition of the service. "From these communications," wrote the Secretary, "it appears that the estimates made provision for the efficient and economical prosecution of the Survey during the ensuing year; it also appears that the provision made by the House Bill will not secure such results. Consequently the arrangement made is not satisfactory to this Department."

We learn from Italy that the idea of boring a tunnel between the peninsula and Sicily has been revived. The estimated cost is said to be seventy-one millions of francs, and the time required for completing the work would be from four to six years. It is stated that the depth of the sea is 160 metres.

The number of foreigners at present residing in France, and settled there, is 1,115,214, against 37,103,689 Frenchmen. The parts of France in which the foreigners are most numerous are of course the frontier departments, those of the Nord, Alpes Maritimes, Var, Bouches du Rhône, &c. In the Seine Department there are 213,529 foreigners; in the Nord 305,524, most of whom are Belgians.

Oyster-production, although carried on to a large extent in France, is not yet a profitable investment. The reason is that the rates for transportation from the oyster-beds are too high. In Auray, for instance, oysters are worth nine francs per thousand; in Paris they cost more than fifty francs. An attempt is being made to secure transportation at less cost.

A movement is on foot in the North Sea towns of Germany for promoting oyster-culture along the coast, supported by Government grants. At present there are fifty-one banks in the North Sea, viz. twenty-six at Fanö, Romö, and Sylt, and twenty-five at Föhr, Amrum, and Hallingerne. In the Baltic, on the other hand, all attempts at oyster-culture have failed. "Holstein" or "Flensburg" oysters—considered the best in Germany—are really English or Dutch. All the German oyster-banks are the property of the State, and leased to private individuals.

We regret to announce the death of Dr. Walfried Marx, Professor of Descriptive Geometry at the Technical High School at Munich. He died on February 10.

The first International Horticultural Exhibition will be held at Dresden on May 7.

Here is a case in which even a little knowledge of physics would not have been out of place. A man was summoned for making use of the communication between passengers and guard without reasonable and sufficient cause. Being in a third-class compartment alone, he was frightened by the singing noise of his foot-warmer, caused by the contraction of metal due to the reduction of temperature. Thinking it an infernal machine, he immediately threw it out of the window, and, not content with this drastic proceeding, he incontinently proceeded to stop the train by using the excellent mode of communicating with the guard and engine-driver which exists on the South-Eastern Railway. A little more science and a little less energy would have saved everybody a little trouble, but as his *bona fides* was as obvious as his ignorance, the magistrate dismissed him with a caution. The magistrate might, perhaps, have done some good if he had told the man what happens when an ordinary kettle is filled with ordinary water and placed on an ordinary fire.

In a recent number, *Science* referred to a supposition that "it is change of diet which is the most potent remote cause of consumption among the Indians." Mr. H. C. Wyman, of Detroit, writes to that journal that, in his opinion, another cause is change change of dress. "If," says Mr. Wyman, "a live rabbit be dipped in a solution of glue, so as to cover its body with a coating impervious to air, it is surprising how quickly the frequency of the respiratory movements increases, showing that the work of the lungs is increased by depriving the skin of free access to the air. The process of civilisation has a somewhat similar effect upon the Indian, though to a less degree. One of the first lessons in the effort to civilise him teaches him to envelop himself in clothing of a kind that tends to impede and impair the normal action of the skin, the pores of which are organs of excretion—a mechanism by which morbid and waste material may be thrown out of the system. Deprived of the assistance afforded under previous conditions by the skin, the work of the lungs is greatly increased, rendering them peculiarly susceptible to bronchitis and pneumonia—ailments which are commonly the forerunners of consumption. If we accept the theory of Koch, they make the lungs a suitable habitation for the *Bacillus tuberculosis*." Mr. Wyman contends that, in the case of civilised races, the liability to consumption from overworked lungs has been tempered by hundreds of generations of ancestors habituated to the use of clothing.

IN the Report of the U.S. Geological Survey on the mineral resources of the United States for 1885, it is stated that the total mineral product is valued at 428,521,356 dollars, an increase of 15,306,608 dollars over 1884. Among seventy mineral substances cited, coal is the most important, showing a total value of 159,019,596 dollars. An increase is shown in the production of coke, natural gas, gold, silver, copper, zinc, quicksilver, nickel, aluminium, lime, salt, cement, phosphate rock, manganese, and cobalt oxide, while the production of coal, petroleum, pig-iron, lead, precious stones, and mineral waters decreased. According to the Report, it is probable that the total output of 1886 was much greater than that of 1885, and even larger than that of 1882.

WE have received the *Annuaire* for 1887 of the Académie Royale des Sciences, des Lettres, et des Beaux-Arts de Belgique. It contains a full account of the organisation of the Academy, and of the means by which it seeks to encourage science, literature, and art. Among the biographical notices are articles on the late Francois Lenormant and Edouard Morren.

AN illustrated work, entitled "Les Civilisations de l'Inde," by Dr. Gustave Le Bon, is being issued in weekly parts by Firmin-Didot et Cie. Dr. Gustave Le Bon is the author of a work on "La Civilisation des Arabes."

THE Calendar of the Imperial University of Japan for the current year, which we have just received, deserves special mention, for it is the first that has been issued since the amalgamation of the well-known College of Engineering and the University of Tokio into the single institution which forms the new University. This incorporation was made the occasion for several organic changes, one of which is the almost total elimination of Europeans from the teaching staff, their places being taken by Japanese. To understand the full extent of the change in this respect, it is necessary to remember that five or six years ago all the professors in the College of Engineering, and nearly all in the University, were Europeans. An examination of the Calendar shows how the new University stands in this respect. By the Imperial decree, which is the charter of the institution, the Council of Professors regulate the studies and generally look after the interests of the University and each of its Colleges. There is not a single Western amongst the nine Councillors. In the Law College, three out of thirteen professors and lecturers are Westerns; in the Medical Faculty, out of thirty-four professors and assistants, there are three Europeans; there are three Europeans amongst twenty-four professors and assistants in the Faculty of Engineering; two in twenty-six in Science; and three in nineteen in Literature. It is probably not too much to say that, where one European is teaching now, there were six Europeans five years ago. It was only to be expected that ultimately the Japanese would have their own men ready to take the places vacated by Europeans. They had at vast expense sent abroad large numbers of youths to be educated for the various professions in Europe and America, who, on their return, were competent to teach their countrymen; and in looking down the lists of the Japanese professors we see that most of them have foreign degrees and other qualifications. They come from almost every German, French, British, and American University, and in some instances have taken high honours. They may therefore be presumed to be competent for the work which they have undertaken, and there is no special reason to believe that the step taken by the Minister of Public Instruction in placing the higher education of the country in the hands of his countrymen is premature. Be this as it may, it is clear that the day of Europeans in Japanese education is past, and this fact is only emphasised by the few familiar names amongst a host of unfamiliar ones in the list of the University. Moreover, even where there are one or two foreign professors, the direction is all in Japanese hands. The Director and the chief Professor in every Faculty are Japanese, so that if the individuals are fewer in number, the functions and status of each one remaining have also diminished. Time alone will show whether the experiment—for undoubtedly the Imperial University is at present in the experimental stage—will be successful or not. He would be a bold man who, for example, prophesied that the Faculty of Engineering in the new University will maintain the high position won for the old Imperial College of Engineering in the world of science by a body of brilliant European professors, some of whom are now in the front rank at home. In the Calendar there is certainly evidence of much activity. An Astronomical Observatory has been fitted up for the instruction of the students; there is also a Seismological Observatory, with horizontal pendulum and vertical-motion seismographs. By the aid of a complete set of these instruments now in the Observatory, it is possible to measure earth-movements of different grades of magnitude. In addition, a system of telegraphic communication with different parts of the city extends the area of observation. A Botanic Garden and a small Marine Biological Laboratory are likewise attached to the Science Department.

THE additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus* ♀) from West Africa, presented by Mr. Julius Wilson; a Secretary Vulture (*Serpentarius reptilivorus*) from South Africa, presented by Capt. Larmer, s.s. *Trojan*; a Crowned Hawk Eagle (*Spizaetus coronatus*) from Natal, presented by Colonel H. Bowker, F.Z.S.; a Spotted Eagle Owl (*Bubo maculosa*) from South Africa, presented by Mr. H. Justice; a Brazilian Hangnest (*Icterus jamaicai*) from Brazil, presented by Mr. W. G. Little Gilmour; two Crossbills (*Loxia curvirostris*), British, presented by Mr. W. H. St. Quintin; two White-fronted Lemurs (*Lemur albifrons*) from Madagascar, deposited; a —— Capuchin (*Cebus* ——) from South America; two Chimachima Milvagos (*Milvago chimachima*) from Brazil, purchased.

OUR ASTRONOMICAL COLUMN

THE BINARY STAR δ EQUULEI.—This close and rapid binary, which was discovered in 1852 by M. O. Struve, and measured on a number of nights between that time and 1874, was supposed by its discoverer to have a period of between 6 and 7 years or one of about 13 years. More recently, Mr. Burnham, who observed the star between 1880 and 1883, concluded from an examination of all the measures that the period was about 10·8 years. It is therefore the most rapid binary now known. At the request of Prof. Glasenapp of St. Petersburg, Herr Wrublewsky (*Astron. Nachr.* No. 2771) has computed a set of elements from all the available observations. He finds the time of periastron passage to be 1892·03, with eccentricity = 0·2011, mean distance, = 0″·406 and period = 11·478 years. These elements do not, however, represent the observed position-angles satisfactorily, and it is desirable that the possessors of sufficiently powerful telescopes should pay some attention to this very interesting object, especially at the present time, when the components are about at their maximum distance apart. Herr Wrublewsky's orbit gives, for 1887·24, position-angle = 204°·9, and distance = 0″·48.

THE TEMPLE OBSERVATORY.—From the Report of Mr. Seabroke, honorary Curator of the Temple Observatory, Rugby,